

WE CLAIM:

1 1. A process for producing alkyl esters useful in biofuels and lubricants by
2 reacting glyceride- or free fatty acid- containing substances in a critical fluid medium,
3 said process comprising the steps of:

4 (a) dissolving the glyceride- or free acid- containing substance and an
5 alcohol or water input into a critical fluid; and

6 (b) reacting the glyceride- or free fatty acid- containing substance with
7 an alcohol or water in the presence of a catalyst to produce final products.

1 2. A process as described in claim 1 wherein said alcohol is an ROH input,
2 wherein R is a short chain alkyl group.

1 3. A process as described in claim 2 where said alcohol is chosen from
2 among the group ethanol, methanol, propanol, butanol, isopropanol and isobutanol.

1 4. A process as described in claim 1 wherein said catalyst is a liquid catalyst.

1 5. A process as described in claim 1 wherein said catalyst is a solid catalyst.

1 6. A process as described in claim 4 wherein said liquid catalyst is an acid.

1 7. A process as described in claim 4 wherein said liquid catalyst is a base.

1 8. A process as described in claim 5 wherein said solid catalyst is an
2 inorganic oxide.

1 9. A process as described in claim 8 wherein said inorganic oxide is from
2 among the group of alumina, silica, silica-alumina, boria, oxides of phosphorus, titanium
3 dioxide, zirconium dioxide, chromia, zinc oxide, magnesia, ion exchange resins, silicate
4 catalysts, and calcium oxide either unmodified or modified with chlorine, fluorine, sulfur
5 or an acid or base.

1 10. A process as described in claim 5 wherein said solid catalyst is an ion
2 exchange resin with either acidic or basic properties.

1 11. A process as described in claim 1 wherein said process further comprises
2 the steps of:

- 3 (a) separating a glycerol product from said final products; and
4 (b) separating an alkyl ester product from said critical fluid.

1 12. A process as described in claim 11 wherein said process further comprises
2 the step of recycling said critical fluid for use in a later reaction.

1 13. A process for producing alkyl esters useful in biofuels and lubricants by
2 reacting a glyceride- containing substance in a critical fluid medium, said process
3 comprising the steps of:

4 (a) dissolving a glyceride- containing substance and an alcohol or
5 water input into a critical fluid; and

6 (b) reacting the glyceride- containing substance and alcohol or water
7 input in a reactor in the presence of a catalyst to produce final products; and

8 (c) separating an alkyl ester product and a glycerol product from the
9 reaction mixture.

1 14. A process as described in claim 13 additionally comprising the step of
2 recycling said critical fluid for re-use in this process.

1 15. A process for reacting fatty acids in a critical fluid medium, said process
2 comprising the steps of:

3 (a) dissolving a fatty acid- containing substance and an alcohol input
4 into a critical fluid; and

5 (b) reacting the fatty acid- containing substance and an alcohol or
6 water input in a reactor in the presence of a catalyst to produce final products; and

7 (c) separating an alcohol ester product and a glycerol product from the
8 reaction mixture.